PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference WO40332	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/IB2004/000248	International filing date *(day/month/year)* 03.02.2004	Priority date *(day/month/year)* 04.02.2003
International Patent Classification (IPC) or national classification and IPC H01M2/10, H01M10/50		
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 3 sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☒	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
23.07.2004	25.02.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Hintermaier, F Telephone No. +49 89 2399-7063

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2004/000248

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
1-11	as originally filed
Claims, Numbers	
1-12	received on 02.12.2004 with letter of 02.12.2004
Drawings, Sheets	
1/7-7/7	as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☒ the claims, Nos. 1
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2004/000248

Box No. II Priority

1. ☒ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
   - ☒ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
   - ☐ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	5 - 12
	No:	Claims	1 - 4
Inventive step (IS)	Yes:	Claims	5 - 11
	No:	Claims	12
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item I

Basis of the report

The amendment made in claim 1 that "a cooling fan is provided, which supplies a cooling medium in a direction of vehicle width" is considered to go beyond the original disclosure, in which only a coolant flow direction from the center to an outward side along the width of the vehicle is disclosed (for example, see [0012 - 0014]). That the coolant can also flow in the opposite direction along the width of the vehicle is not taught. Moreover, the cooling fan is provided at the outward side of the vehicle width (see also Figs. 5 and 6, and claim 5). Hence, the amendment is considered as a generalization which contravenes the provisions of Article 34.2(b) PCT. Therefore this report is established as if the above amendment had not been made (Rule 70.2(c)).

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: US-B-6 188 5741 (ANAZAWA MAKOTO) 13 February 2001 (2001-02-13)

D2: US-A-5 501 289 (CHIBA KOUJI ET AL) 26 March 1996 (1996-03-26)

D3: MIYAMOTO T ED - JAPAN ELECTRIC VEHICLE ASSOCIATION (JEVA): "ADVANCED BATTERY SYSTEM FOR ELECTRIC VEHICLE (FEV-II)" EVS - 13. 13TH. INTERNATIONAL ELECTRIC VEHICLE SYMPOSIUM. OSAKA, OCT. 13 - 16, 1996. SESSIONS 1A - 4H, EVS. INTERNATIONAL ELECTRIC VEHICLE SYMPOSIUM, TOKYO, JEVA, JP, vol. VOL. 1 SYMP. 13, 13 October 1996 (1996-10-13), pages 37-44, XP000687895

D4: "ELECTRIQUE, HYBRIDES, PILES A COMBUSTIBLE: LE CATALOGUE GENERAL MOTORS Ü" INGENIEURS DE L'AUTOMOBILE, RAIP. BOULOGNE, FR, no. 720, 1 April 1998 (1998-04-01), pages 38-39, XP000765127 ISSN: 0020-1200

D5: US-A-5 555 950 (HARADA JUNICHI ET AL) 17 September 1996 (1996-09-17)

2. Novelty (Article 33(2) PCT).

2.1. D1 discloses a cooling structure for an electric vehicle (abstract). Fig. 1 shows a battery box 10 in which a set of batteries 30 are mounted on rails 21 and 22 located on a bottom plate 11 (col. 3, line 1 - 14). Fig. 7 shows the arrangement of the box 10 in a car. The batteries 30 are stacked along a longitudinal direction relative to the vehicle and can be found under a front and under a rear seat. Bottom plate 11 is considered as a part of the floor panel. Hence, claims 1 - 3 of the present application lack novelty with respect to D1.
To the subject-matter of these claims claim 4 and claim 16 add that there is a "space portion [...] adjacent to the battery body [...] at a side [...] that faces a center line of a width of the vehicle". However, the expression "space portion" is a broad term which does not specify the amount of space at said side. Since in D1 there is some open space on all sides of the battery stack claim 4 lacks novelty as well.

2.2. D2 describes a floor structure of an electric vehicle (abstract) comprising a set of batteries 10 stacked along a longitudinal direction relative to the vehicle and supported by a lower panel 14, which is considered as a part of the floor (Figs. 1 - 5, 11 and 12). The middle portion of Fig. 11 is located in the passenger room of the vehicle (col. 5, line 35 - 41). Hence, the greatest part of this portion will be located under the seats.
Therefore, claims 1 - 4 are not novel in view of D2.

2.3. D3 reports on a battery system for electric vehicles having a set of lithium ion batteries located below the floor board.
D4 mentions use of nickel hydride batteries in vehicles.
D5 discloses a body structure for an electric vehicle and focuses on means to control the kinetic energy of the batteries during a collision (abstract).
None of D3 - D5 is considered as prejudicial for novelty of the independent claim 1 of the present application, because in the structures disclosed by these documents the batteries are located below the floor board.

2.4. Claim 5 is novel, because D1 and D2 do not report on having a cooling fan "provided at a side of the battery body opposite from the side that faces the center line of the width of the vehicle".

2.5. Claim 12 is novel, because D1 and D2 do not mention to use lithium ion or metal hydride batteries.

3. Inventive step (Article 33(3) PCT).

3.1. Claim 12 is not considered inventive, because use of lithium ion or metal hydride batteries for electric vehicles is state of the art (D3, D4).

3.2. With respect to the prior art documents cited above as the objective technical problem to be solved it is seen to provide a comparatively small sized battery pack which can be stowed between a seat and a floor panel of a vehicle and which does not exceed the area of the seat. A feature which significantly contributes to the size of a battery pack is its cooling structure. By providing the means for generating a coolant flow on those sides of a battery pack that lay on the outer side and on the center side of the width of the vehicle, the battery structure conforms to the space requirements of the seats.
This solution is not hinted by D1 - D5, which would prompt the skilled person to arrange the cooling means along a longitudinal direction of the vehicle.

4. Industrial applicability (Article 33(4) PCT).

Claims 1 - 12 fulfill the requirement of industrial applicability, since subject-matter of present application can be made or used (in a technological sense) in industry (Article 33(4) PCT).

Re Item VII
Certain defects in the international application

The provisions of Rule 5.1.a.ii PCT are not met, because the most relevant prior art documents are not cited, e.g. documents D1 and D2.

Re Item VIII

Certain observations on the international application

1. Statements, like such on page 11, line 20 - 26, which try to expand the matter for which protection is sought in a vague and not precisely defined way, for example as lying within the "spirit and scope of the invention", render the definition of the subject-matter of the claims unclear (Article 6 PCT).

2. Reference numerals 2030, 1010 and 1130 cannot be found in Figs. 6 and 7 although the description on page 8, line 19 - 29, makes use of these numerals in the discussion of these figures.

CLAIMS:

1. A vehicular battery mounting structure characterized in:

that a battery pack having a plurality of battery unit cells or battery modules in accordance with a performance of a vehicle is disposed between a floor panel of the vehicle and a seat disposed above the floor panel, and

that the plurality of battery unit cells or battery modules are stacked in a longitudinal direction relative to the vehicle.

2. The vehicular battery mounting structure according to claim 1, wherein the seat is a seat that does not have a power seat function.

3. The vehicular battery mounting structure according to claim 1 or 2, wherein the seat is a passenger seat or a rear seat.

4. The vehicular battery mounting structure according to any one of claims 1 to 3, wherein the battery pack comprises a battery body formed by the plurality of battery unit cells or battery modules, and a space portion that is adjacent to the battery body and that is provided at a side of the battery body that faces a center line of a width of the vehicle.

5. The vehicular battery mounting structure according to claim 4,

wherein the battery pack further comprises a cooling fan, and

wherein the cooling fan is provided at a side of the battery body opposite from the side that faces the center line of the width of the vehicle, and the cooling fan supplies a cooling medium between the battery unit cells, or between the battery modules.

6. The vehicular battery mounting structure according to claim 5, wherein the cooling fan supplies the cooling medium through the battery body from the side that faces the center line of the width of the vehicle to the side opposite from the side that faces the center line of the width of the vehicle.

7. The vehicular battery mounting structure according to claim 5, wherein the cooling fan supplies the cooling medium through the battery body from the side that faces the center line of the width of the vehicle to the side opposite from the side that faces the center line of the width of the vehicle, and discharges the cooling medium into a cabin.

8. The vehicular battery mounting structure according to claim 7, wherein the battery pack further comprises diffusion means for diffusing the cooling medium discharged from the cooling fan into the cabin.

9. The vehicular battery mounting structure according to claim 8, wherein the diffusion means includes a plurality of outlets.

10. The vehicular battery mounting structure according to any one of claims 5 to 9, wherein a suction direction of the cooling fan is a direction of a rotating axis of the cooling fan, and a discharge direction of the cooling fan is a circumferential direction relative to the cooling fan.

11. The vehicular battery mounting structure according to any one of claims 5 to 10, wherein the cooling fan is a sirocco fan.

12. The vehicular battery mounting structure according to any one of claims 1 to 11, wherein the battery pack is formed by a lithium ion battery or a nickel metal hydride battery.

13. A vehicular battery mounting structure mounting comprising:

a floor panel;

a seat disposed above the floor panel;

a battery pack having a plurality of battery unit cells or battery modules in accordance with a performance of a vehicle, the battery pack being disposed between the floor panel and the seat so that the plurality of battery unit cells or battery modules are stacked in a longitudinal direction relative to the vehicle.

14. The vehicular battery mounting structure according to claim 13, wherein the seat is a seat that does not have a power seat function.

15. The vehicular battery mounting structure according to claim 13, wherein the seat is a passenger seat or a rear seat.

16. The vehicular battery mounting structure according to claim 13, wherein the battery pack comprises a battery body formed by the plurality of battery unit cells or battery modules, and a space portion that is adjacent to the battery body and that is provided at a side of the battery body that faces a center line of a width of the vehicle.

17. The vehicular battery mounting structure according to claim 16,

wherein the battery pack further comprises a cooling fan provided at a side of the battery body opposite from the side that faces the center line of the width of the vehicle, and

wherein the cooling fan supplies a cooling medium between the battery unit cells, or between the battery modules.

18. The vehicular battery mounting structure according to claim 17, wherein the cooling fan supplies the cooling medium through the battery body from the side that faces the center line of the width of the vehicle to the side opposite from the side that faces the center line of the width of the vehicle.

19. The vehicular battery mounting structure according to claim 17, wherein the cooling fan supplies the cooling medium through the battery body from the side that faces the center line of the width of the vehicle to the side opposite from the side that faces the center line of the width of the vehicle, and discharges the cooling medium into a cabin.

20. The vehicular battery mounting structure according to claim 19, wherein the battery pack further comprises a diffusion portion for diffusing the cooling medium discharged from the cooling fan into the cabin.

21. The vehicular battery mounting structure according to claim 20, wherein the diffusion portion includes a plurality of outlets.

22. The vehicular battery mounting structure according to claim 17, wherein a suction direction of the cooling fan is a direction of a rotating axis of the cooling fan, and a discharge direction of the cooling fan is a circumferential direction relative to the cooling fan.

23. The vehicular battery mounting structure according to claim 17, wherein the cooling fan is a sirocco fan.

24. The vehicular battery mounting structure according to claim 13, wherein the battery pack is formed by a lithium ion battery or a nickel metal hydride battery.